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## PATENT COOPERATION TREATY

## **PCT**

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

REC'D 2 3 NOV 2005

PCT WIPO

(PCT Article 36 and Rule 70)

Applicant's or	agent's file reference			
P26,229A PC1	•	FOR FURTHER	ACTION	See Form PCT/IPEA/416
International a		International filing d	ate (day/month/year)	
PCT/US04/108	61			Priority date (day/month/year)
International Pa	tent Classification (IF	C) or national classification	n and IPC	09 April 2003 (09.04.2003)
Tro(1): HOLD 2	3/485 and US Cl.: 15	6/73.1		
Applicant	···			
	OFFA INVESTMENT			
1. This	s report is the intermining Authority un	mational preliminary ex nder Article 35 and trans	amination report, establismitted to the applicant ac	shed by this International Preliminary
2. This	REPORT consists	of a total of 3 sheets, i	ncluding this corner at a st	colding to Article 36.
3. This	- report is also accor	mpanied by ANNEXES,	comprising:	
a	(sent to the appli	icant and to the Internati	ional Bureau) a total of	_ sheets, as follows:
	this report and Section	and/or sheets containing 607 of the Administrate	d/or drawings which have g rectifications authorized	e been amended and are the basis of d by this Authority (see Rule 70.16
<del>-</del>	that goes b Box No. I a	on supersede earlier sheet eyond the disclosure in the supplemental Po	ets, but which this Author the international applicati	ity considers contain an amendment on as filed, as indicated in item 4 of
b		mational Rurage and	- 4-1-1 00	
	Administrative I	ne Supplemental Box (instructions).	Relating to Sequence	ad number of electronic carrier(s)) ereto, in electronic form only, as Listing (see Section 802 of the
4. This 1	eport contains indic	cations relating to the fol	lowing items:	
$\boxtimes$	Box No. I	Basis of the report	- · · - · · · · · · · · · · · · · · · ·	
	Box No. II P	Priority		
	Box No. III N	Non-establishment of opi	nion with regard to novel	ty, inventive step and industrial
닏		ack of unity of invention		-
$\bowtie$	Box No. V R	easoned statement und	er Article 25(2)	gard to novelty, inventive step or
	Box No. VI C	ertain documents cited	ations and explanations s	gard to novelty, inventive step or upporting such statement
		ertain defects in the inter	Trational application	
	Box No. VIII Ce	ertain observations on the	e international application	
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November 2004	(04.11.000.0		Date of completion of t	his report
	v4.11.2004)		10 November 2005 (10.11	
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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.	
PCT/US04/10861	

- 1	Boy No. 1 Posica 511	PCT/US04/10861
- 1	Box No. I Basis of the report	
	1. With regard to the language, this report is based on:	
	the international application in the language in which it was filed	
- 1	a translation of the international application into English	
	a translation of the international application into English, which purposes of:	is the language of a translation furnished for the
	international search (under Rules 12.3 and 23.1(b))	
	publication of the international application (under Rule 12.4	
	international preliminary examination (under Rules 55.2(a)	and/or 55.3(a))
	<ol> <li>With regard to the elements of the international application, this report is based to the receiving Office in response to an invitation under Article 14 are referred annexed to this report):</li> </ol>	
	the international application as originally filed/furnished	
	ine description:	
	pages 1-19 as originally filed/furnished	
	pages* NONE received by this Authority on received by this Authority on	
	pages* NONE received by this Authority on  the claims:	
	pages 20-24 as Originally Stades	
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	pages* NONE received by this Authority on pages* NONE received by this Authority on	under Article 19
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1	ine drawings:	
	pages 1-4 as originally filed/furnished	
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	a sequence listing and/or any related table(s) - see Supplemental Bo	x Relating to Sequence Listing
3.	The amendments have resulted in the cancellation of:	
	the description, pages	
	the clams, Nos	_
	and drawnings, sileets/figs	i i
	sequence fishing (specify):	
	any table(s) related to the sequence listing (specify):	
4.	This report has been established as if (some of) the amendments annexed to since they have been considered to go beyond the disclosure as filed, as indicated to go beyond the disclosure as filed to go beyond the gold to go be	this report and listed below had not been made, cated in the Supplemental Box (Rule 70.2(c)).
	the description, pages the claims. Nos	
	and drawings, sneets/ngs	
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	any table(s) related to the sequence listing (specify):	
* <i>If</i> 1	HEIN 4 ADDILLES. SOME OF All of there is	
orm l	item 4 applies, some or all of those sheets may be marked "superseded." PCT/IPEA/409 (Box No. I) (April 2005)	

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No. PCT/US04/10861

1. Statement  Novelty (N)  Claims 4-9,13-23,27-37  Claims 1-3,10-12,24-26,38  Inventive Step (IS)  Claims 4.5,18,19,21,32,33,35  YE  Claims 1-3,6-17,20,22,21,34,36,00	Box No. V Reasoned statement under Arrapplicability; citations and exp	ticle 35(2) with regard to novelty, inventive step or planations supporting such statement	industrial
Claims 4-9,13-23,27-37  Claims 1-3,10-12,24-26,38  Inventive Step (IS)  Claims 4.5,18.19.2132.33.35  YE  Claims 1-3,6-17.20,22-31,34.36-38  NO  Industrial Applicability (IA)  Claims 1-38  Claims NONE  NO  Claims 1-38  YE  Claims 1-38  YE  Claims 1-38  NO  Industrial Applicability (IA)  Claims 1-38  NONE  NO  Claims 1-38  NONE  NO  Claims 1-38  NONE  NO  Claims 1-3, 10-12, 24-26 and 38 lack novelty under PCT Article 33(2) as being anticipated by Ramm (WO-A-0101478).  Annulated and include the applicant. See page 3, line 13 through page 6, near 27 and claims 9 and 19.  Laims 6-9, 13-17, 20, 22, 23, 27-31, 34, 36 and 37 lack an inventive step under PCT Article 33(3) as being obvious over Ramm (WO-0101478) as described above in view of Aoka et al (US 2002/0155702).  Oka et al discloses forming a barrier layer of CuN on a copper interconnect by use of a nitrogen-containing plasma. See paragraph 61 eystem of Ramm in order to facilitate manufacture of the structural elements. In addition, without the disclosure of unexpected bould have been obvious to ome having ordinary skill in the art to employ a nitrogen-containing plasma, as taught by Aoka et al, in sults, it is the examiner's position that the specific plasma and sputtering technique are well known and conventional in the art and inclusive examiner's position that the specific plasma and sputtering technique are well known and conventional in the art and include the examiner's position that the specific plasma and sputtering technique are well known and conventional in the art and include the specific plasma and sputtering technique are well known and conventional in the art and include the specific plasma and sputtering technique are well known and conventional in the art and include the disclosure of unexpected outd have been obvious to employ in the system of Ramm as a matter of design choice based upon desired physical properties of the interior and the copper interconnect prior to formation of the CuN layer.	1. Statement	such statement	
Inventive Step (IS)  Claims 1-3,10-12,24-26,38  NO  Claims 4.5,18.19.21.32.33.35  YE  Claims 1-3,6-17.20,22-31,34,36-38  NO  Industrial Applicability (IA)  Claims 1-38  Claims NONE  NONE  NO  Claims 1-38  NO  Claims 1-3, 10-12, 24-26 and 38 lack novelty under PCT Article 33(2) as being anticipated by Ramm (WO-A-0101478).  Annum discloses a structural element and a method for manufacturing structural elements. This system involves forming an inter- tierabilic connection in wire bonding which employs CuN in the manner claimed by the applicant. See page 3, line 13 through page 6,  laims 6-9, 13-17, 20, 22, 23, 27-31, 34, 36 and 37 lack an inventive step under PCT Article 33(3) as being obvious over Ramm (WO-  10101478) as described above in view of Aoka et al (US 2002/0155702).  Oka et al discloses forming a barrier layer of CuN on a copper interconnect by use of a nitrogen-containing plasma. See paragraph 61  system of Ramm in order to facilitate manufacture of the structural elements. In addition, without the disclosure of unexpected  would have been obvious to one having ordinary skill in the art to employ a nitrogen-containing plasma, as taught by Aoka et al, in sults, it is the examiner's position that the specific plasma and sputtering technique are well known and conventional in the art and bicles being manufactured.  In addition, without the disclosure of unexpected by the system of Ramm as a matter of design choice based upon desired physical properties of the idea being manufactured.  In addition, without the disclosure of the curb and a matter of design choice based upon desired physical properties of the idea being manufactured.  In addition, without the disclosure of mexpected and the system of Ramm as a matter of design choice based upon desired physical properties of the idea being manufactured.  In addition, without the disclosure of mexpected and the system of the curb and the system	Novelty (N)	Claims 4-9 13-23 27-27	
Inventive Step (IS)  Claims 4.5.18.19.21.32.33.35  YE  Claims 1-3.6-17.20.22-31.34.36-38  NO  Industrial Applicability (IA)  Claims 1-38  Claims 5.0NE  NO  Claims 1-38  NONE  NO  Claims 1-38  NONE  NO  Claims 1-3, 10-12, 24-26 and 38 lack novelty under PCT Article 33(2) as being anticipated by Ramm (WO-A-0101478).  amm discloses a structural element and a method for manufacturing structural elements. This system involves forming an interestablic connection in wire bonding which employs CuN in the manner claimed by the applicant. See page 3, line 13 through page 6, ne 27 and claims 9 and 19.  laims 6-9, 13-17, 20, 22, 23, 27-31, 34, 36 and 37 lack an inventive step under PCT Article 33(3) as being obvious over Ramm (WO-10101478) as described above in view of Aoka et al (US 2002/0155702).  looka et al discloses forming a barrier layer of CuN on a copper interconnect by use of a nitrogen-containing plasma. See paragraph 61 would have been obvious to one having ordinary skill in the art to employ a nitrogen-containing plasma, as taught by Aoka et al, in experiment of Ramm in order to facilitate manufacture of the structural elements. In addition, without the disclosure of unexpected pull have been obvious to employ in the system of Ramm as a matter of design choice based upon desired physical properties of the laims 4, 5, 18, 19, 21, 32, 33 and 35 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly agest the step of actively forming an oxide layer on the copper interconnect prior to formation of the CuN layer.			YE
Claims 1-3.6-17.20,22-31.34,36-38 NC  Industrial Applicability (IA) Claims 1-38 YE.  Claims NONE NONE  Claims NONE  Claims NONE  Claims NONE  Claims 1-38 YE.  Claims NONE  Claims 1-38 Test system involves forming an interestablic connection in wire bonding which employs CuN in the manner claimed by the applicant. See page 3, line 13 through page 6, as a claims 9 and 19.  See page 3, line 13 through page 6, as a claims 9 and 19.  See page 3, line 13 through page 6, as a claims 9 and 19.  See page 3, line 13 through page 6, as a claims 9 and 19.  See page 3, line 13 through page 6, as a claims 9 as described above in view of Aoka et al (US 2002/0155702).  See et al discloses forming a barrier layer of CuN on a copper interconnect by use of a nitrogen-containing plasma. See paragraph 61 system of Ramm in order to facilitate manufacture of the structural elements. In addition, without the disclosure of unexpected ulds, it is the examiner's position that the specific plasma and sputtering technique are well known and conventional in the art and cless being manufactured.  See page 3, line 13 through page 6, as a claim of the complex of the structural elements. In addition, without the disclosure of unexpected uld have been obvious to employ in the system of Ramm as a matter of design choice based upon desired physical properties of the cless being manufactured.  See page 3, line 13 through page 6, and 19 late and 19 l	Institut Cl. Co.		NC
Industrial Applicability (IA)  Claims 1-38  Claims NONE  Claims 1-38  Claims NONE  Claims NONE  Claims NONE  Claims NONE  Claims 1-38  Claims NONE  Claims 1-38  Claims NONE	miventive Step (18)		YES
Claims NONE  Claims A so being anticipated by Ramm (WO-A-0101478).  Amm discloses a structural element and a method for manufacturing structural elements. This system involves forming an interestable connection in wire bonding which employs CuN in the manner claimed by the applicant. See page 3, line 13 through page 6, aims 6-9, 13-17, 20, 22, 23, 27-31, 34, 36 and 37 lack an inventive step under PCT Article 33(3) as being obvious over Ramm (WO-101478) as described above in view of Aoka et al (US 2002/0155702).  As et al discloses forming a barrier layer of CuN on a copper interconnect by use of a nitrogen-containing plasma. See paragraph 61 system of Ramm in order to facilitate manufacture of the structural elements. In addition, without the disclosure of unexpected uld have been obvious to one having ordinary skill in the art to employ a nitrogen-containing plasma, as taught by Aoka et al, in ults, it is the examiner's position that the specific plasma and sputtering technique are well known and conventional in the art and uld have been obvious to employ in the system of Ramm as a matter of design choice based upon desired physical properties of the claims 4, 5, 18, 19, 21, 32, 33 and 35 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly gest the step of actively forming an oxide layer on the copper interconnect prior to formation of the CuN layer.  Interconnect prior to formation of the CuN layer.		Claims <u>1-3,6-17.20,22-31,34,36-38</u>	NC
Claims NONE  Claims 1-3, 10-12, 24-26 and 38 lack novelty under PCT Article 33(2) as being anticipated by Ramm (WO-A-0101478).  Committee and the applicant. See page 3, line 13 through page 6, aims 6-9, 13-17, 20, 22, 23, 27-31, 34, 36 and 37 lack an inventive step under PCT Article 33(3) as being obvious over Ramm (WO-101478) as described above in view of Aoka et al (US 2002/0155702).  Claims None  Claim	Industrial Applicability (IA)	Claims 1-38	
Citations and Explanations (Rule 70.7) laims 1-3, 10-12, 24-26 and 38 lack novelty under PCT Article 33(2) as being anticipated by Ramm (WO-A-0101478).  arm discloses a structural element and a method for manufacturing structural elements. This system involves forming an interteallic connection in wire bonding which employs CuN in the manner claimed by the applicant. See page 3, line 13 through page 6, e27 and claims 9 and 19.  aims 6-9, 13-17, 20, 22, 23, 27-31, 34, 36 and 37 lack an inventive step under PCT Article 33(3) as being obvious over Ramm (WO-101478) as described above in view of Aoka et al (US 2002/0155702).  ka et al discloses forming a barrier layer of CuN on a copper interconnect by use of a nitrogen-containing plasma. See paragraph 61 system of Ramm in order to facilitate manufacture of the structural elements. In addition, without the disclosure of unexpected ultd, it is the examiner's position that the specific plasma and sputtering technique are well known and conventional in the art and cles being manufactured.  ims 4, 5, 18, 19, 21, 32, 33 and 35 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly gest the step of actively forming an oxide layer on the copper interconnect prior to formation of the CuN layer.  ims 1-38 meet the criteria set out in PCT Article 33(4), and thus meet industrial applicability because the subject matter claimed can made or used in industry.	•		
arms 1-3, 10-12, 24-26 and 38 lack novelty under PCT Article 33(2) as being anticipated by Ramm (WO-A-0101478).  The discloses a structural element and a method for manufacturing structural elements. This system involves forming an interestallic connection in wire bonding which employs CuN in the manner claimed by the applicant. See page 3, line 13 through page 6, a line 13 through page 6, a line 14 through page 6, a line 15 through page 6, a line 16 through page 6, a line 17, 20, 22, 23, 27-31, 34, 36 and 37 lack an inventive step under PCT Article 33(3) as being obvious over Ramm (WO-10101478) as described above in view of Aoka et al (US 2002/0155702).  The discloses forming a barrier layer of CuN on a copper interconnect by use of a nitrogen-containing plasma. See paragraph 61 system of Ramm in order to facilitate manufacture of the structural elements. In addition, without the disclosure of unexpected uld have been obvious to employ in the specific plasma and sputtering technique are well known and conventional in the art and cless being manufactured.  The disclose in the system of Ramm as a matter of design choice based upon desired physical properties of the lines 4, 5, 18, 19, 21, 32, 33 and 35 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly gest the step of actively forming an oxide layer on the copper interconnect prior to formation of the CuN layer.  The disclose inventor and the system of the structural applicability because the subject matter claimed can be added or used in industry.	Citations		NC
•	arm discloses a structural element and a method for the tetallic connection in wire bonding which employs C tetallic connection in wire bonding which employs C tetallic connection in wire bonding which employs C tetallic connection in wire 27 and claims 9 and 19.  aims 6-9, 13-17, 20, 22, 23, 27-31, 34, 36 and 37 la 20101478) as described above in view of Aoka et al (laka et al discloses forming a barrier layer of CuN or would have been obvious to one having ordinary skip system of Ramm in order to facilitate manufacture ults, it is the examiner's position that the specific pludd have been obvious to employ in the system of Forming and a system of Forming 4, 5, 18, 19, 21, 32, 33 and 35 meet the criteria gest the step of actively forming an oxide layer on the system of actively forming an oxide layer on the step of actively forming an oxide layer on the system of the criteria set out in PCT Article 33 made or used in industry.	or manufacturing structural elements. This system involves a CuN in the manner claimed by the applicant. See page 3, linuck an inventive step under PCT Article 33(3) as being obvious 2002/0155702).  In a copper interconnect by use of a nitrogen-containing plasm ill in the art to employ a nitrogen-containing plasma, as tauge of the structural elements. In addition, without the disclosure and sputtering technique are well known and convention as a matter of design choice based upon desired physical set out in PCT Article 33(2)-(3), because the prior art does the copper interconnect prior to formation of the CuN layer	forming an inter- e 13 through page 6, ous over Ramm (Wo- na. See paragraph 61 th by Aoka et al, in the of unexpected onal in the art and ical properties of the